What is claimed is:

1. An integrated circuit package, comprising:

a first electrical integrated circuit (EIC);

a photonic integrated circuit (PIC) comprising an active element, an optical coupling element at a surface of the PIC, and one or more waveguides, the first EIC being attached to the surface of the PIC overlapping a portion of the PIC, the active element being located in the portion of the PIC overlapped by the first EIC, the active element being electrically connected to the first EIC, and the optical coupling element being in another portion of the PIC not overlapped by the first EIC;

a spacer protruding from the surface of the PIC in the other portion of the PIC not overlapped by the first EIC, the spacer being transparent for light in an operative wavelength band of the PIC,

wherein the transparent spacer is positioned over the optical coupling element, and the transparent spacer, optical coupling element, and one or more waveguides provide a first optical path through the package to the active element for light in the operative wavelength band.

2. The package of claim 1, further comprising a second EIC attached to the surface of the PIC and overlapping a further portion of the PIC not overlapped by the first EIC or the spacer.

3. The package of claim 2, wherein the spacer is located between the first EIC and the second EIC.

4. The package of claim 3, wherein the first EIC overhangs a first edge of the PIC and the second EIC overhangs a second edge of the PIC opposite the first edge.

5. The package of claim 1, wherein a surface of the first EIC opposite the PIC and a surface of the spacer opposite the PIC are offset in a direction normal to the surface of the PIC by 10 μm or less.

6. The package of claim 5, wherein the surface of the first EIC and the surface of the spacer are substantially coplanar.

7. The package of claim 1, further comprising an optical interface affixed to the spacer on a surface of the spacer opposite the PIC, the optical interface comprising a connector for receiving at least one optical fiber and one or more optical elements arranged to direct light in the operative wavelength band from the optical fiber to the optical coupling element.

8. The package of claim 7, wherein the optical interface comprises a polarizing beam splitter for splitting an optical signal into a pair of signals having orthogonal polarization states prior to the pair of optical signals entering the PIC or for combining a pair of orthogonal polarized optical signals exiting the PIC.

9. The package of claim 7, wherein the one or more optical elements comprise at least one focusing element for focusing light through the spacer to the optical coupling element.

10. The package of claim 7, wherein the optical interface comprising an array of lenses, at least one of the lenses in the array corresponding to the one or more optical elements arranged to direct the light in the operative wavelength band from the optical fiber to the optical coupling element.

11. The package of claim 1, wherein the spacer is composed of a material selected from the group consisting of Ge, Si, ZnS, ZnSe, AlO, and MgF.

12. The package of claim 1, wherein the spacer is composed of an amorphous inorganic material.

13. The package of claim 1, wherein the spacer comprises one or more portions of a transparent material bonded to the surface of the PIC.

14. The package of claim 1, further comprising a redistribution layer (RDL) electrically connected to the first EIC, the RDL comprising an opening aligned with the spacer.

15. The package of claim 1, wherein the optical path is part of a bidirectional photonic channel between the first EIC and a component external to the package, the bidirectional photonic channel comprising the first optical path and a second optical path between another optical coupling element and another active element.

16. The package of claim 1, further comprising a molding compound at least partially encapsulating the PIC, the EIC, and the spacer.

17. The package of claim 16, wherein at least some of the molding compound is located between the EIC and the spacer.

18. The package of claim 16, wherein a surface of the molding compound is coplanar with a surface of the spacer opposite the PIC.

19. A method for manufacturing an integrated circuit (IC) package, comprising:

providing a base assembly comprising a photonic integrated circuit (PIC), the PIC comprising an active element, a coupling element at a surface of the PIC, and one or more waveguides providing an optical path through the PIC between the optical coupling element and the active element for light in an operative wavelength band of the PIC;

attaching a first spacer to a surface of the base assembly over a first portion of the PIC including the optical coupling element, the spacer being transparent for light in the operative wavelength band;

attaching a first electrical IC (EIC) to the surface of the base assembly overlapping a second portion of the PIC away from the optical coupling element;

depositing a first molding compound over the first spacer and the first EIC to form a layer of the first molding compound encapsulating the first EIC and the first spacer; and

removing a first portion of the first molding compound from the layer of the first molding compound to expose a surface of the first spacer opposite the PIC.

20. The method of claim 19, further comprising, after removing the first portion, attaching an optical interface for an optical fiber to the layer of first molding compound at the exposed surface of the first spacer.

21. The method of claim 19, wherein providing the base assembly comprises attaching a second spacer to a surface of the PIC at the first portion of the PIC, the second spacer being transparent for light in the operative wavelength band;

depositing a second molding compound over the second spacer and the surface of the PIC to form a layer of the second molding compound encapsulating the PIC and the second spacer; and

removing a second portion of the second molding compound from the layer of the second molding compound to expose a surface of the second spacer facing away from the PIC,

wherein the first spacer is subsequently attached to the exposed surface of the second spacer.

22. The method of claim 21, wherein the first molding compound is the same as the second molding compound.

23. The method of claim 21, wherein the base carrier comprises electrical interconnects protruding from the surface of the PIC, removing the portion of the second molding compound exposes the electrical interconnects, and attaching the first EIC to the surface of the base assembly electrically connects the first EIC to the active element in the PIC via a first of the electrical interconnects.

24. The method of claim 19, wherein the EIC is a first EIC and the method further comprises, prior to depositing the first molding compound, attaching a second EIC to the surface of the base assembly at a location different from the first EIC.

25. The method of claim 24, wherein the first molding compound is deposited over the second EIC.

26. The method of claim 25, wherein removing the portion of the first molding compound provides a coplanar surface over the first and second EICs and the first spacer, the coplanar surface being flush with the exposed surface of the first spacer.

27. The method of claim 19, wherein the first spacer is attached to the surface of the base assembly using a transparent adhesive.

28. The method of claim 19, wherein depositing the first molding compound comprises applying a flowable precursor over the first spacer and the EIC and curing the precursor.

29. The method of claim 19, wherein removing the portion of first molding compound comprises grinding the first layer of the first molding compound.

30. The method of claim 19, wherein the active element is an electro-absorption modulator (EAM).

31. The method of claim 19, wherein the base assembly comprises a first redistribution layer overlapping the surface of the PIC, the first redistribution layer defining an opening overlapping the optical coupling element.